

THREE SPECIES OF ISOPODA BOPYRIDAE NEW TO THE FAUNA OF THE PHILIPPINES

JOHN C. MARKHAM

Arch Cape Marine Laboratory, Arch Cape,
Oregon 97102-0105, U.S.A.

ABSTRACT

Palaemonellione cebuensis gen. et sp. nov. is described as a parasite of the palaemonid shrimp *Palaemonella pottsi* (Borradaile) from Cebu, Philippines. The new genus is closely similar to *Probopyrus* Giard and Bonnier. *Allokepon sinensis* (Danforth 1972) is reported for the first time from the Philippines as a parasite of the portunid crab *Portunus pelagicus* (Linnaeus), a host previously recorded for this parasite elsewhere. The single female is the first immature one of *A. sinensis* known. *Diplophryxus gracilis* sp. nov. is described as a parasite of the palaemonid shrimp *Urocaridella gracilis* Borradaile (?).

KEYWORDS: Crustacea, decapoda, Isopoda, Bopyridae, *Palaemonellione cebuensis*, *Allokepon sinensis*, *Diplophryxus gracilis*, new genera, new species, parasites, Philippines.

INTRODUCTION

The fauna of Isopoda Bopyridae of the Philippines is only poorly known, whereas it would be expected to be very large because of that archipelago's location in the tropical western Pacific Ocean. Semper (1881) described *Bopyrus* (now *Probopyrus*) *ascendens*, the first bopyrid ever recorded in freshwater, from a Philippine mountain stream. Richardson (1910) recorded nine additional species from the Philippines, all but two described as new. Nierstrasz and Brender à Brandis (1929, 1931) added four species, two of them newly described. Bourdon (1976, 1981) reported eight species previously unknown from the Philippines, including three described as new to science. Finally, Palisoc (1987) added one more species to that fauna. Other scattered reports also cite the Philippine occurrence of four more unidentified species, some of which are probably undescribed. Recently, specimens of three more species of Philippine bopyrids in various museum collections have become available for study; one represents a new genus and species, one a new species in an existing genus, and one a new geographical record. Thus the number of named bopyrid species known from the Philippines now stands at 26, of which 15 claim that archipelago as type-locality. Because that number is probably far short of the number of species

actually occurring there, it is too early to present a key to (or even a list of) Philippine species, which would be expected to become quickly obsolete.

SYSTEMATICS

Family Bopyridae Rafinesque Subfamily Bopyrinae Rafinesque *Palaemonellione* gen. nov.

Type-species. *Palaemonellione cebuensis* sp. nov.

Diagnosis. Female: Body only moderately distorted. Head completely separated from pereon and somewhat extending out from it; maxilliped with articles deeply separated, palp articulating and consisting of two partly fused articles. Pereomeres all distinct and misaligned laterally, each slightly indented on both sides; oostegites completely surrounding but not covering brood pouch, all heavily pigmented; first oostegite without internal ornamentation or posterolateral point; pereopods doubling in size posteriorly. Pleomeres medially fused but distinct laterally and posteriorly; pleopods uniramous flaps, only on long side; no uropods.

Male: Body over three times as long as wide. Head fused with pereon except at sides. Pereomeres distinct; pereopods relatively large, all about same size, all with meri and carpi fused, dactyli progressively smaller

posteriorly. Pleon set off from final pereomere and narrower than it, rather long and subrectangular, completely lacking appendages.

Host: In palaemonid genus *Palaemonella*.

Etymology: derived from generic name of known host, *Palaemonella* + bopyrid generic name *lone*. Gender feminine.

Palaemonellione cebuensis sp. nov.

(Figs 1, 2)

Type Material. Infesting *Palaemonella pottsi* (Borradaile), A. J. Bruce, det. of host. Moalboal, Cebu, Philippines, March/April 1983, V. Storch coll. #97. 1 female, holotype; 1 male, allotype, Northern Territory Museum, NTM Cr. 006489.

Description. Female holotype (Fig. 1). Length 2.6 mm, maximal width 1.7 mm, head length 0.5 mm, head width 0.7 mm, pleon length 0.9 mm. Body axis distortion 72°. All body regions distinct (Fig. 1A, B).

Posterior margin nearly semicircular, slightly extended from pereon. Short frontal lamina reaching clear across front of head but not along sides. Irregularly slit-shaped eyes medially placed. Antennae 1 and 2 (Fig. 1C) of 3 and 4 articles, respectively, all but basal articles distally somewhat setose. Maxilliped (Fig. 1D) suboval, its segments deeply separated, posterior one smaller; large, articulating palp (Fig. 1E) arising from anteromedial corner, incompletely 2-segmented, non-setose; plectron (Fig. 1F) sharply pointed, arched forward. Barbula indiscernible.

All pereomeres distinct, their lateral margins forming irregular outline, nearly all more or less subdivided laterally. Oostegites completely surrounding brood pouch and covering all but middle portion of ventral surface of pereon; first oostegite (Fig. 1G) irregularly rounded both anteriorly and posteriorly, posterior segment broader but shorter, internal ridge unadorned, posterolateral point completely absent; fifth oostegites much longer than others, extending far posteriorly and partly covering pleon. Pereopods (Fig. 1I, J) of about constant proportions but doubling in size posteriorly; all meri and carpi with setose anterior margins, some fused into single article, others separate.

Pleon (Fig. 1K) medially fused, but five pleomeres separated laterally; first two ple-

omeres on short side extending as slender flaps. Three uniramous flaplike pleopods on long side, none on short side. No uropods.

Male allotype (Fig. 2). - Length 0.96mm, maximal width 0.30mm, head length 0.15mm, head width 0.21mm, pleon length 0.25mm, pleon width 0.21mm. Head and first pereomere fused, but all other body segments distinct (Fig. 2A,B).

Head nearly as wide as first pereomere, extending prominently forward from it. Large fairly faint kidney-shaped eyes near posterolateral borders. Antennae 1 and 2 (Fig. 2C,D) of 3 and 4 articles, respectively, first one with all articles setose, second one with setae only terminally; basal segment of antenna 2 perpendicular to others.

Sides of pereon subparallel, pereomeres not deeply separated laterally. Pereopods (Fig. 2E,F) all of nearly same size, though bases progressively larger and dactyli progressively smaller posteriorly; all carpi and meri fused with slight indentation indicating lost segmentation.

Pleon abruptly narrower than pereon, completely fused into single piece, broadly triangular in outline. All appendages absent, but paired tufts of minute setae (Fig. 2G) on slightly raised posteroventral region indicating traces of lost uropods.

Etymology. The specific name *cebuensis* refers to the type-locality, Cebu Island, the Philippines.

Remarks. Heretofore, branchially infesting bopyrids (all in the subfamily Bopyrinae) belonging to four different genera have been recorded as parasites of shrimps of the family Palaemonidae. The most numerous of these occur in the genus *Probopyrus*, the others belonging to *Schizobopyrina* (of which many species have been recorded as members of *Bopyrina*), *Bopyrus*, *Allobopyrus* and *Probynia*. *Palaemonellione* resembles all of these genera in some particulars but also differs significantly from each. In general shape and pigmentation of the oostegites, the female of *P. cebuensis* closely resembles those of *Probopyrus*; females of *Probopyrus* differ in having nonarticulating maxilliped palps, strongly pointed first oostegites and all pleomeres distinct on both sides; males of *Probopyrus* have all pereopodal articles present, distinct pleomeres and at least traces of pleopods (Markham 1985a). Females of

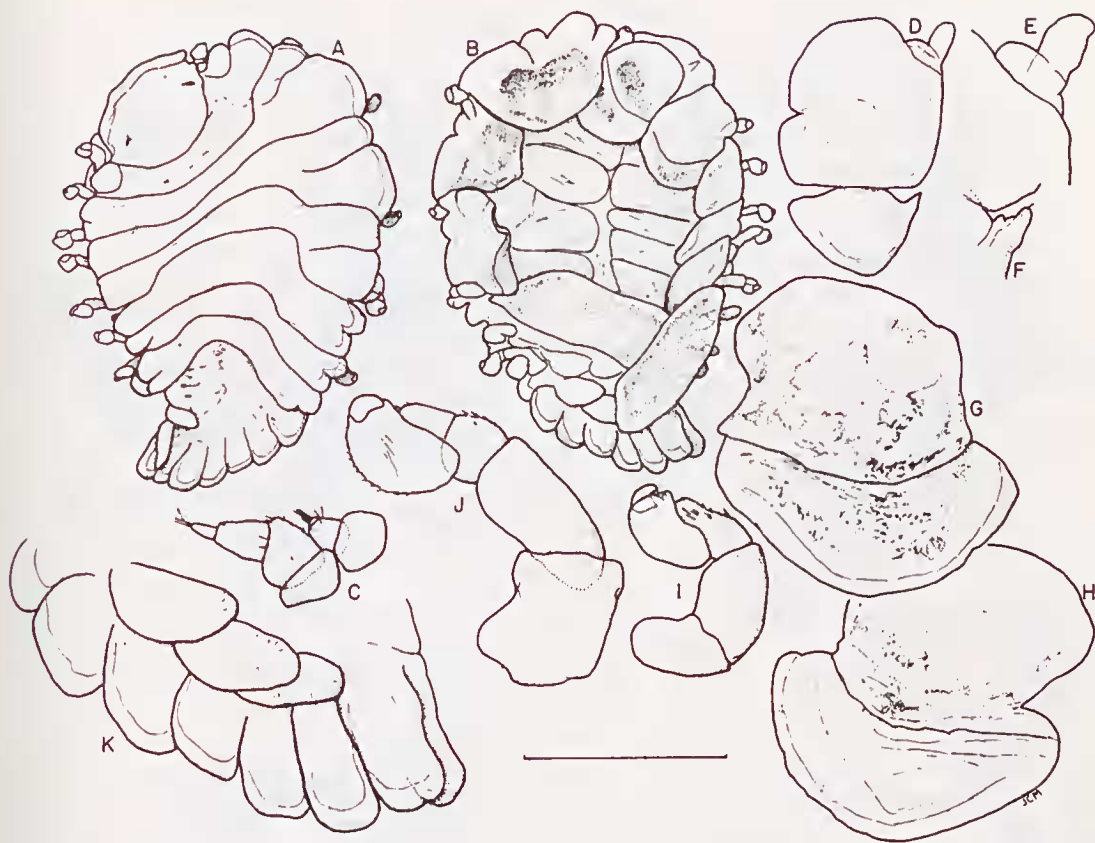


Fig. 1. *Palaemonellione cebuensis*, holotype female: A, dorsal view; B, ventral view; C, right antennae; D, right maxilliped; E, palp of same; F, plectron of same; G, right oostegite I, external view; H, same, internal view; I, right pereopod 1; J, right pereopod 7; K, pleon, ventral view. Scaleline: 1.1mm for A, B; 0.4mm for D, G, H, K; 0.2mm for C, E, F, I, J.

Schizobopyrina have dimorphic first oostegites with long posterolateral points and completely distinct pleomeres; males of that genus have lateral indications of four pleomeres and at least traces of pleopods (Markham 1985a). Females of *Bopyrus* differ from that of *Palaemonellione* in the same way as those of *Probopyrus*, while males of *Bopyrus* have pleomeres distinct or at least laterally indicated and pleopods present (Bourdon 1968). The female of *Allobopyrus* differs from that of *Palaemonellione* in the same ways as those of *Probopyrus* and also has biramous pleopods; the male of *Allobopyrus* is unknown (Bourdon and Bruce 1983). The female of *Probynia* is much more distorted; further, it and its male both differ from those of *Palaemonellione* in the same ways as both sexes of *Probopyrus* (Bourdon and Bruce 1983). Among genera whose species do not infest

palaemonids, *Bopyrina* is closely similar in that its females have asymmetrically fused pleons, but their maxillipeds lack palps, their first oostegites are dimorphic and elongate, the other oostegites are greatly reduced, and pleopods are nearly similar on both sides; males of *Bopyrina* are similar to those of *Palaemonellione* in having heads and pereons fused and no pleopods, but their elongate pleons are divided into some pleomeres (Markham 1985a). In the genus *Bopyroides*, females have much reduced maxillipedal palps and clearly demarcated pleomeres completely lacking appendages, while the males have separated heads (Bourdon 1968). Finally, in *Palaemonellione*, the asymmetry of the female's pleopods set it off from all other genera.

Although no species of *Palaemonella* has previously been reported branchially infested

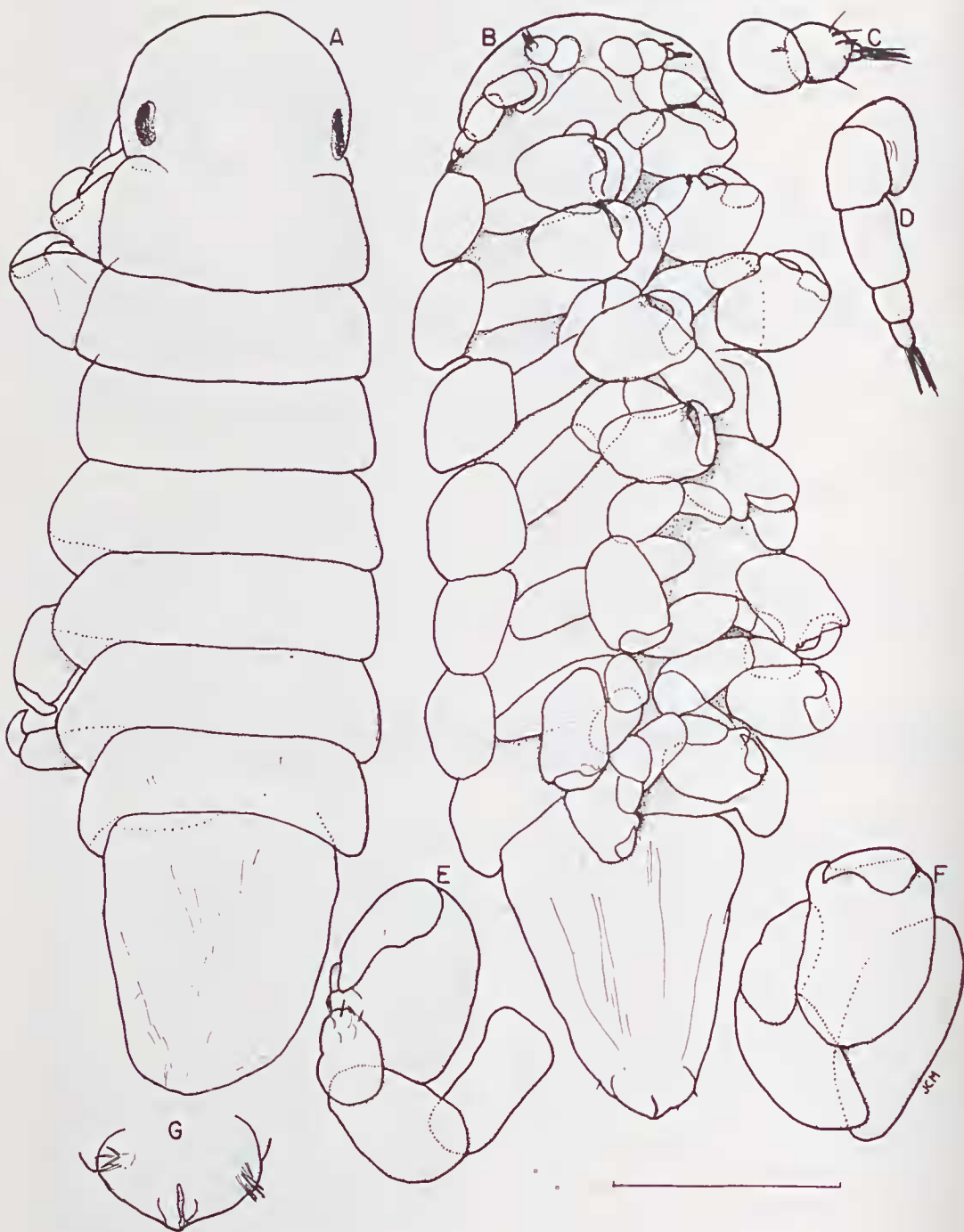


Fig. 2. *Palaemonellione cebuensis*, allotype male: A, dorsal view; B, ventral view; C, left antenna 1; D, right antenna 2; E, left pereopod 1; F, left pereopod 7; G, end of pleon, ventral view. Scaleline: 0.2mm for A, B; 0.1mm for C-G.

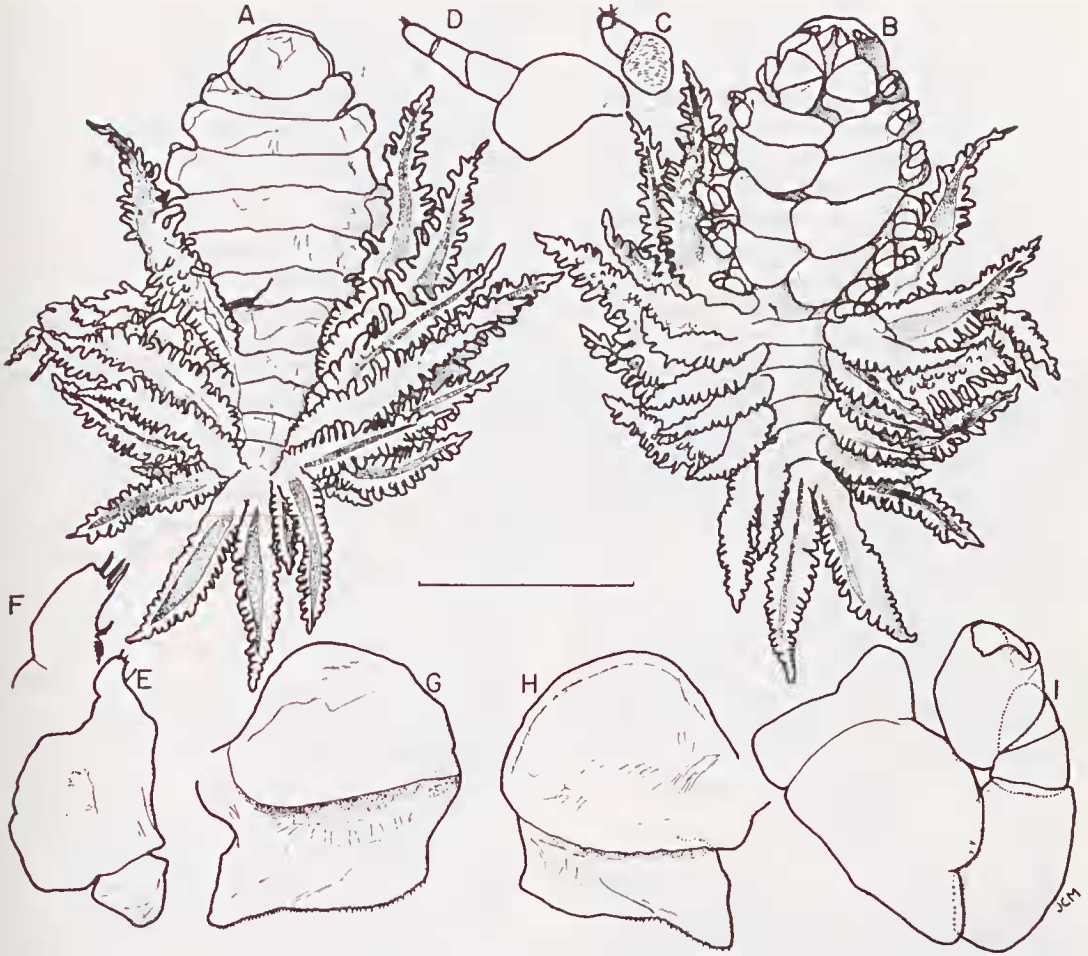


Fig. 3. *Allokepon sinensis*, immature female: A, dorsal view; B, ventral view; C, right antenna I; D, right antenna 2; E, left maxilliped; F, palp of same; G, right oostegite 1, external view; H, same, internal view; I, right pereopod 1. Scaleline: 4.0mm for A, B; 0.9mm for E, G, H; 0.3mm for C, D, F, I.

by a bopyrid, *P. rotumana* Borradaile is known to bear the abdominally infesting (Subfamily Hemiarthrinae) species *Metaphrixus intuitus* Bruce in Singapore (Bruce 1979) and northwestern Australia (Bruce 1986), while *P. vestigialis* Kemp is recorded as host of the same species in Zanzibar (Bruce 1965). This is thus the first record of bopyrid infestation of *P. pottsi*.

Subfamily Ioninae H. Milne Edwards
Allokepon sinensis (Danforth)
 (Fig. 3)

Grapsicepon sinensis Danforth, 1972:163-167, Fig. 1 (Hong Kong; infesting portunid crab *Lissocarcinus orbicularis* Dana).
Allokepon sinensis - Markham 1982:357-359, 385, Fig. 19 (Redescription of holotype

female; reassignment to *Allokepon*, gen. nov.); Markham 1985b:3, 38-40, 63, Figs. 18-19; Table 1 (Phuket, Thailand; infesting portunid crab *Portunus pelagicus* (Linnaeus); redescription of male).

Material. Infesting *Portunus pelagicus* (Linnaeus), J. S. Garth, det. of host. From unrecorded locality, Philippines. 1 immature female, California Academy of Sciences.

Descriptive notes. Body length (exclusive of appendages) 3.0mm, maximal body width 1.4mm, head length 0.4mm, pleon length 1.0mm. Body axis distortion 14°.

Similar to mature females previously seen, except: body smaller and proportionately much narrower; middorsal bosses greatly reduced and very difficult to discern (and not visible in drawing) though two present; ooste-

gites not quite covering pereon ventrally; pleopods relatively large and extended.

Remarks. All of the differences from other specimens cited above seem attributable to the immaturity (as indicated by the absence of a male, the complete lack of eggs and the small size) of this female. It is especially noteworthy that the middorsal pleonal bosses are markedly underdeveloped, because the number and structure of those bosses are important characters for the definition of *Allokepon* and allied genera; thus it is valuable to know that they become conspicuous only with maturity. In the present case, identification was difficult until the host was identified and served as a guide. The particular structures of the maxilliped, first oostegite and pereopods, all illustrated, conform closely enough with those previously known to confirm the identification.

This is the first record of *Allokepon sinensis* in the Philippines, but the present host, *Portunus pelagicus*, has previously been reported bearing it in Thailand (Markham 1985b).

Diplophryxus gracilis sp. nov.
(Figs 4, 5)

Type material. Infesting *Urocaridella gracilis* Borradaile (?), A. J. Bruce, det. of host. MUSORSTOM 3 "Coriolis" Station CP/142, Philippines, 11°47'N, 123°02'E, 26-27m, 6 June 1985. 1 female, holotype; 1 male, allotype, Muséum National d'Histoire Naturelle, Paris.

Description. Female holotype (Fig. 4). Length 2.6 mm, maximal width 1.4 mm, head length 0.6 mm, head width 0.4 mm, pleon length 1.4 mm. Double body axis distortion, head-pereon 80°, pereon-pleon 42°. Head distinct but pleon fused with pereon (Fig. 4A,B).

Hexagonal head deeply set into pereon, overreached by one oostegite and four pereopods. Middorsal surface grooved, probably containing minute antennae, though no antennae discernible. Maxilliped (Fig. 4C) elongate, with irregularly oblique anterolateral margin lacking palp and small triangular posterior article. Barbula indiscernible.

Pereon ovate, extending forward beyond head and backward over half of pleon. First oostegites (Fig. 4D-G) strongly dimorphic, enclosed in brood pouch; right one much

reduced, its anterior article much larger than posterior one; left first oostegite with anterior article short and broad and posterior article long and slenderly pointed. Left oostegite 2 arching over front of body from ventral to dorsal region, its outer surface densely crenulate; oostegites 2-4 enclosing brood pouch but gaping slightly open. Only two pereopods on long (left) side, pressed against anterior margin of head, both reduced (Fig. 4H); first pereopod opposite (Fig. 4I) very long and prominently extending beyond anterior margin of body from in front of head; tiny pereopods 2-6 (Fig. 4J) on that side spaced along side of pereon, somewhat larger right pereopod 7 beneath pleon.

Pleon long and slender, arising from ventral region of pereon. Pleomeres fused except for slight separation posteriorly. Four pairs of biramous lateral plates and four pairs of similar biramous pleopods, their lanceolate flexible rami extending far beyond sides and end of pleon; some rami produced into slender points. Terminal bulbous pleomere (Fig. 4K) lacking appendages, produced into nipple-like posterior point.

Male allotype (Fig. 5). Length 0.5mm, maximal width 0.2mm, head length 0.1mm, head width 0.1mm, pleon length 0.2mm. All body segments distinct. Spots of pigment scattered on dorsal surface.

Head abruptly narrower than first pereomere, extending prominently forward from it. Large dark irregularly shaped eyes near posterolateral borders. Antennae too minute to distinguish.

Sides of pereon subparallel, but some pereomeres with markedly misaligned margins, pereomeres not deeply separated laterally. Pereopods too tiny for illustration, evidently all of nearly same size.

Pleon about as broad as pereon, completely fused into single piece, broadly triangular in outline. All appendages absent. Posterior margin produced into slightly separated knob.

Etymology. The specific name *gracilis*, meaning "slender" refers to the body outlines of both sexes and the pleon and pleonal appendages of the female; it also reflects the specific name of the only known host of the new species, the palaemonid shrimp *Urocaridella gracilis*.

Remarks. Worldwide, there are five other accepted species of *diplophryxus*; three of them infest *Alpheus* spp. (Family Alpheidae),



Fig. 4. *Diplophryxus gracilis*, holotype female: A, dorsal view; B, ventral view; C, right maxilliped; D, right oostegite 1, external view; E, same, internal view; F, left oostegite 1, external view; G, same, internal view; H, left pereopod 1; I, right pereopod 1; J, right pereopod 5; K, tip of pleon in dorsal view. Scaleline: 1.00mm for A, B; 0.56mm for C-G; 0.35mm for H-J; 0.18mm for K.

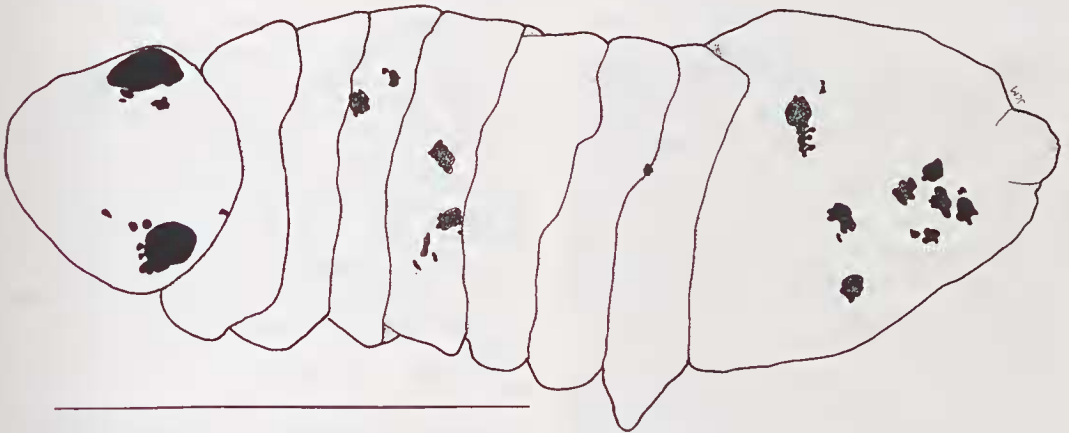


Fig. 5. *Diplophryxus gracilis*, allotype male in dorsal view. Scaleline: 0.2mm.

one infests a *Gnathophyllum* (Gnathophyllidae), and the other *Leander* spp. (Palaemonidae). All of the females, as well as that of *D. gracilis*, are immediately recognizable as members of *Diplophryxus* in having compound distortion, a dorsal groove on the head containing the antennae, one or both second oostegites extending over to the dorsal surface, only two complete pereopods on the longer side and the pleopodal rami and lateral plates multidivided. Males of the genus are

indistinguishable from those of several other hemiarthrine genera. Two characters which readily set off the female of *D. gracilis* from all others are the very slender central portion of its pleon and the bulbous terminal pleomere produced into a peculiar knob. The females of *D. jordani* Richardson from India, Japan and Thailand (Markham 1985b) and *D. siankaanensis* Markham from the northwestern Atlantic (Markham 1988) appear most similar to that of *D. gracilis*, but neither

has its two distinctive characters. Unfortunately, the minute size of the allotype male of *D. gracilis* made it impossible to determine enough characters to permit contrasts with other species.

Urocaridella gracilis has been reported as the host of two bopyrine (branchial) bopyrids in India (Chopra 1923), but neither it nor any other species of *Urocaridella* is previously known as a host of a hemiarthrine parasite.

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